Advanced Science and Technology Institute
Department of Science and Technology

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Advanced Science and Technology Institute

Annual Report 2004

Department of Science and Technology

Advanced Science and Technology Institute
Annual Report 2004


...moving beyond possibilities
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Vision

"The Advanced Science and Technology Institute shall be among the leading Research and Development centers in Information and Communications Technology (ICT) and Electronics within the South East Asian region."

Mission

"The Advanced Science and Technology Institute is committed to the development of the Filipino society and the Philippines as a nation. We shall contribute to the attainment of national development priorities and the growth of Philippine enterprises by providing innovative solutions using ICT and Electronics technology."

ESTRELLA F. ALABASTRO, Ph.D.

Secretary, Department of Science and Technology

I would like to commend ASTI for its unrelenting commitment and dedication in carrying out research and development (R&D) in the fields of Information and Communications Technology (ICT) and Microelectronics.

The year 2004 witnessed a series of projects implemented and completed, trainings and workshops conducted and attended, and partnerships forged, among others. Amidst challenges and transitions, ASTI has remained steadfast in its mission to conduct sustainable R&D in ICT and Microelectronics to produce innovative, relevant and useful products and services for the Filipino nation.

All of these accomplishments would not have been possible, if not for the dedicated and hard working men and women of ASTI. May you continue to strive for excellence, pursue new strategies and develop novel ideas that will make ASTI more dynamic and responsive to the needs of its clientele.

On behalf of the Department of Science and Technology, my congratulations and good wishes to ASTI in the years to come.

DENIS F. VILLORENTE

Officer-In-Charge and Deputy Director
Advanced Science and Technology Institute

2004, for ASTI was prolific and dynamic as we continued to pursue our mandate and commitment to contribute to nation-building and economic development through our R&D and Technology Transfer Programs. These could not have been achieved without the ardent dedication, hard work and continuous support of the men and women of the Institute and of our partners in government, industry and the academe.

The Institute completed various projects, continued the implementation of and support to some of its pioneering projects and started new ones. It completed four (4) projects, namely: Bayanihan Linux Terminal Server Project (BLTSP) for Veritas Parochial School; System Software Development for Wireless Mobile Devices; Pilot Testing of Linux Terminal Server Project (LTSP) at the UP Diliman Department of Computer Science; and Bayanihan Linux versions 3 and 3.1. It also continued implementing some of its pioneering projects such as: the Philippine Research, Education and Government Information Network (PREGINET); Bayanihan Linux; Pilot Testing of Thin Client Set-up; and Radio Frequency (RF) Microelectronics for Wireless Technology-Phase II: Development of Advanced Broadband Wireless System.

Ongoing implementation of other projects under ASTI's Microelectronics R&D Program is also being undertaken, namely: the Microelectronics Design for Philippine Electronics Industry, An Essential Component for Global Competitiveness: Digital, Analog and Mixed Signal Components for Signal Processing and Wireless Applications that aims to contribute to the country's electronics industry through the transfer of the knowledge acquired through R&D to the academe and industry through training and consultancy; the Embedded Systems Development which is primarily involved in product/system development such as the Digital Multimeter, GSM Data Terminal and Linux device drivers, among others.

The Institute has also started the implementation of new projects such as the Connectivity of Quirino State College and nearby High Schools to PREGINET, the DOST Information and Communications Technology (DOST-ICT) Project, and the Development of Computer-Aided Instruction Materials for Science and Mathematics Education.

In the past year, ASTI also participated in conferences, trainings and symposia to gain and enhance knowledge to produce better outputs. ASTI also established and sustained partnerships with different local and international institutions to reinforce linkages and continue to pursue collaborative activities.

For 2005, ASTI will be undergoing changes that will bring about a more efficient and service-oriented organization. An organizational structure that will enable the Institute to provide more focus on its programs, and at the same time, accord significant contributions to the community is being established. This is also in line with the national government's efforts to streamline and review organizational performance, and provide a more customer-centered and proactive organization.

With these accomplishments, ongoing activities and the challenges and opportunities that ASTI will face in this coming year, we hope we will be able to provide more services and bring significant contributions to national development as we pursue to be in the leading edge for R&D in ICT and Electronics in the South-East Asian region.

To all the people behind ASTI's success especially our partners, my colleagues and the DOST, thank you very much.

ASTI has proven its worth once again.

Denis Villorente


Sun

Highlights

The Advanced Science and Technology Institute (ASTI) continues to pursue its commitment towards nation-building and economic development through the conduct of its mandate of carrying out research and development in the fields of Information and Communications Technology (ICT) and Microelectronics.

For the year 2004, here are some of the highlights of the programs and projects implemented by the Institute:

Under ASTI's **ICT R&D Program**, four (4) projects were completed, namely:

- **Bayanihan Linux Terminal Server Project for Veritas Parochial School**, which successfully deployed a cost-effective thin client computing system in the said school;
- **System Software Development for Wireless Mobile Devices,** which was able to develop the Bayanihan Bluetooth Developer's Toolkit, an integrated open source Bluetooth solution for local developers;
- **Pilot Testing of a Client/Server Set-up as a Low Cost, Low Maintenance Computing System for Philippine Schools**, which installed and tested the LTSP system for Itaas Elementary School in Muntinlupa and San Bartolome High School in Novaliches;
- **Bayanihan Linux: An Open Source Desktop System**, which currently promotes and advocates Bayanihan Linux versions 3 and 3.1 to government and academic institutions, and major ICT companies.

ASTI also continues to implement and maintain some of its pioneering projects such as:

- **The Philippine Research, Education, and Government Information Network (PREGINET)** – the DOST Executive Committee has approved the PREGINET Sustainability Plan for its continuous operation as the country's only Research & Education Network;
- **Development of Bayanihan Linux Terminal Server** - a cost-effective Open Source thin client solution called Bayanihan Linux Thin Client Manager was developed;
- **Radio Frequency Microelectronics for Wireless Technologies: Phase II (Development of Advanced Broadband Wireless System)** – a PC-based Access Point (PCAP), a low-cost broadband wireless system prototype, was developed. The project also started the prototype production and testing of an RF Transceiver Kit;
- **ASTI Management Information System** – Several information systems were developed to improve the administrative operations of the institute.

Likewise, ASTI started the implementation of three (3) new projects:

- **Connectivity of Quirino State College and Nearby High Schools to the Philippine Research, Education and Government Information Network;**
- **DOST Information and Communications Technology (DOST ICT) Project; and**
- **Development of Computer-Aided Instruction Materials for Science and Mathematics Education.**

Under ASTI's **Microelectronics R&D Program**, two (2) of its main projects continued with development efforts that aim to contribute to the country's electronics industry. These projects are:

- **Microelectronics Design for Philippine Electronics Industry, An Essential Component for Global Competitiveness: Digital, Analog and Mixed Signal Components for Signal Processing and Wireless Applications; and**
- **Embedded Systems Development**

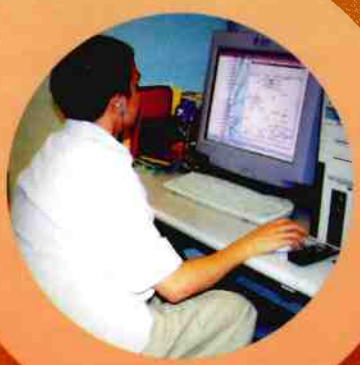
Through the Technology Transfer Program the Advanced Science and Technology Institute continually propagates its developed products and technologies through the Institute's Technology Transfer Program. For 2004, four (4) ASTI-developed products received support for their full commercialization from DOST's Technology Incubation for Commercialization Program (TECHNICOM). These products are the Digital Multimeter; Human Breast Milk Pasteurizer; PC-Based Access Point Deployment Kit; and Bayanihan Linux Terminal Server Installer.

Likewise, a number of ASTI's products and technologies were propagated through technical services (a total of 2,084 rendered for 2004); trainings and seminars (reaching a total of 33 trainings conducted for the year); consultancy services (around 693 rendered); technology diffusion (24 technologies/products/services were diffused to more than 7,000 potential adopters); and contract research (four contract research projects were completed in 2004).

The Advanced Science and Technology Institute maintains its scientific linkage and institutional cooperation with other international research and education networks through its active participation in APAN, AI3, and TEIN2 activities. On October 2004, the Philippines, through ASTI, hosted the 2004 AI3 Autumn Meeting. The meeting was held at the University of San Carlos -- Talamban Campus, and had a total of 38 foreign delegates and 70 local participants who attended.

Looking Ahead

For 2005, ASTI will be undergoing changes that will bring about a more efficient and service-oriented organization. With this, expect the Institute to be at the frontline for R&D in the ICT and Microelectronics sectors in the Philippines.



Programs and Projects

Information and Communications Technology (ICT) R&D Program

Under the ICT R&D Program of the Institute, on-going projects fall under three (3) major areas, namely: Bayanihan Linux, wireless technologies, and broadband and network technologies. Also, two new projects whose implementation started in 2004 are focused on computer-aided instruction, and the DOST-wide ICT infrastructure set-up and maintenance.

Development of a High Performance Research and Education Network: The Philippine Research, Education and Government Information Network or PREGINET (On-going)

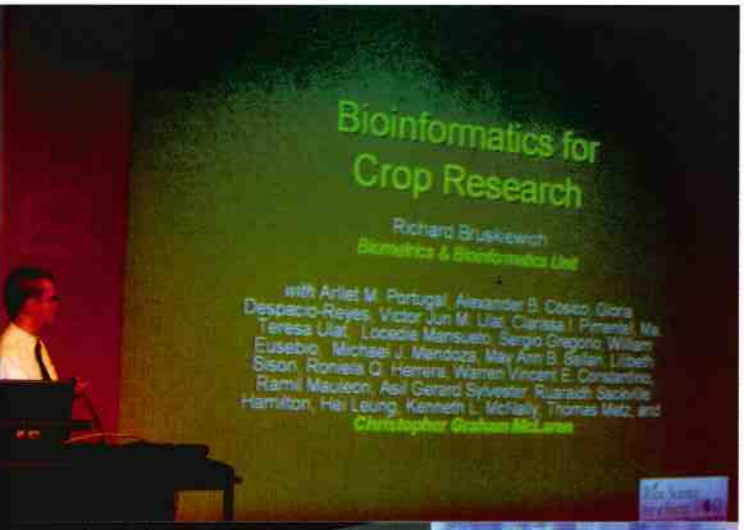
With the PREGINET project now on its fifth and final year under DOST funding, most of the efforts for 2004 were focused on the planning, drafting, and implementation of the Sustainability Plan, which puts in place strategic structures and mechanisms for PREGINET to continue its purpose and objective as the research and education network of the country. The highlights of the PREGINET project for the year include:

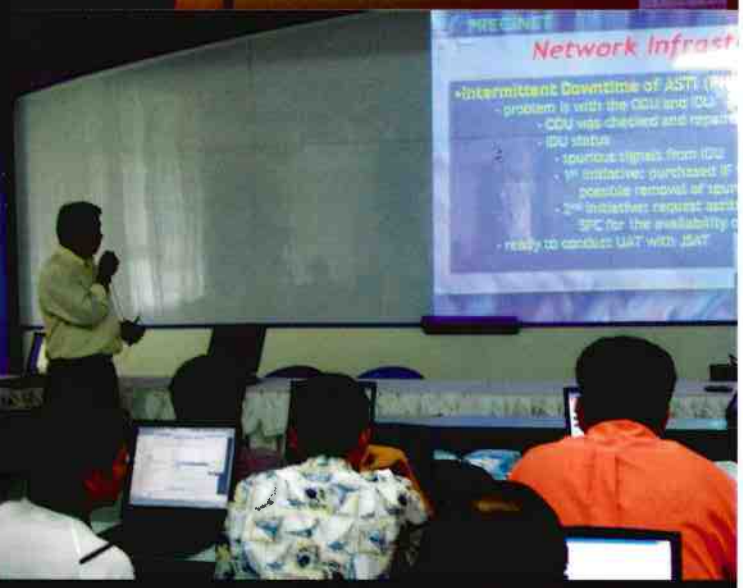
Partnerships Forged

PREGINET connected and forged partnerships with 12 institutions, including: Ateneo de Manila University – Computer Science Department; University of San Carlos – Talamban Campus; National Computer Center - National Computer Institute; House of Representatives; Department of Agriculture; Commission on Higher Education; Development Academy of the Philippines; National Library; DOST Regional Office XII; Provincial Government of Agusan del Sur; PHIVOLCS; and the Philippine eLibrary Project. With this, PREGINET now has a total of 95 partners (as of December 31, 2004) coming from the Academe (38%), Government (34%), and Research & Development Institutions (28%).

1st Philippine R&E Network Symposium and 2nd PREGINET National Partners' Meeting

This annual PREGINET event was held on May 24 to 26, 2004 at the Montebello Villa Resort, Banilad, Cebu City. It convened all PREGINET project stakeholders (partner institutions, DOST agencies, regional offices and councils) to discuss updates on the project and resolve issues and concerns relating to its implementation and, at the same time, to demonstrate the products and services being developed by the different research teams of PREGINET. The event was co-sponsored by the Central Visayas Information Sharing Network Foundation Inc. (CVISNET) and DOST Regional Office VII.





The activities for the network symposium included:

- Demonstration of the new applications developed by PREGINET's research teams, including Multimedia over IP, Virtual Classroom, Network Monitoring (NetMon), and the PREGINET Digital Content System and Library Management System
- Technical talks on High Availability System, Internet Protocol version 6, and Network Usage Policy
- Launching of the NetMon v1.0 Beta

Formation of the PREGINET Interim Policy Board

The highlight of the partners' meeting was the selection of the PREGINET Interim Policy Board, which comprises the governing body of the PREGINET Organization. Initial activities of the Board were identified in the ad-hoc meeting carried out.

A follow-up meeting of the Interim Policy Board was held on July 22, 2004 in Legazpi City, Bicol, coinciding with the NSTW 2004. Policy recommendations on the different aspects of the PREGINET Organization were presented and discussed.

Launching of PREGINET in Region V during the NSTW 2004

During the NSTW 2004, PREGINET spearheaded the live streaming of the event and facilitated the video press conference.

1st Annual Bioinformatics Conference

Together with NIMBUS, ASTI co-organized the 1st Annual Bioinformatics Conference on October 15 at the International Rice Research Institute. The Conference, which was a gathering of bioinformatics practitioners and experts coming from research and development (R&D) institutions, government, academe, and industry, addressed the need for information sharing and training in the field.

Supercomputing Global Conference 2004 (SC Global 2004)

ASTI was one of more than 50 sites that participated in the SC Global 2004 on November 9 to 11 2004 through the Access Grid (AG). SC Global 2004, the world's leading conference on high performance computing, networking and storage, was held in Pittsburgh, USA. The Philippines was specially mentioned during the opening of the SC Global 2004, being a "certified and connected" AG node. It is the country's first time to participate in this global conference.

Megaconference 2004

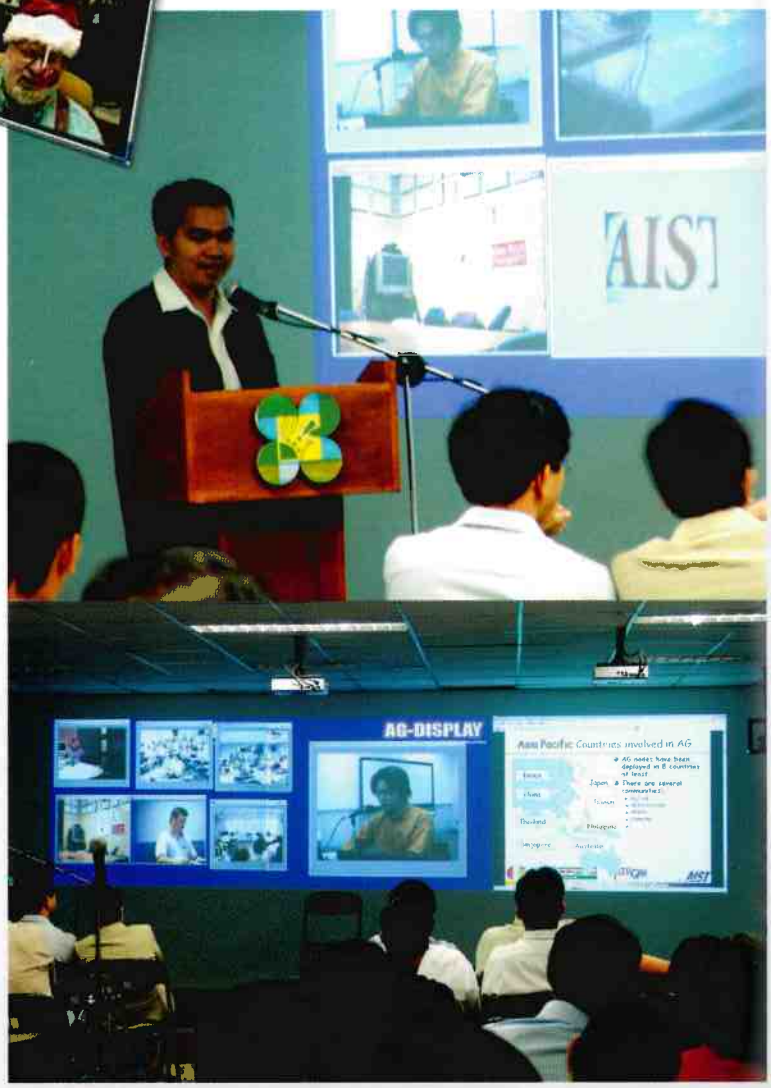
PREGINET participated in the annual global videoconferencing event Megaconference VI held on December 9, 2004. Technology was central to the event as thousands of participants gathered simultaneously from all continents of the world using advanced networks. All in all, 372 sites participated, with an estimated audience of around 3,000.

Set-up of the Philippine Access Grid Node

ASTI became the first Access Grid Node in the Philippines. With the set-up of the AG node in ASTI, the Philippines is now among the more than 150 operational AG sites in about 30 countries worldwide. These countries include, among others, the USA, UK, Netherlands and other Asian countries like India, China, Taiwan and Thailand. This means that the country can now participate in collaborative activities with these established AG nodes, including research and fora on issues covering agriculture, medicine, supercomputing, environment, and advanced science such as high-energy physics, genomics and bioinformatics. ASTI aims to extend this technology to partners in the government, academe, and other R&D institutions.

Deployment of APBioBox and SunBioBox Applications

Bioinformatics is one of the steadfast communities under PREGINET. The APBioBox and SunBioBox were installed, tested, and documented, and are now ready for their deployment. With these initiatives and with NIMBUS, the focal bioinformatics working group in the Philippines, working hand-in-hand with ASTI, the Institute strives to become the Bioinformatics Infrastructure and Computing Center for the country.



Development of the Pawikan Network Management System

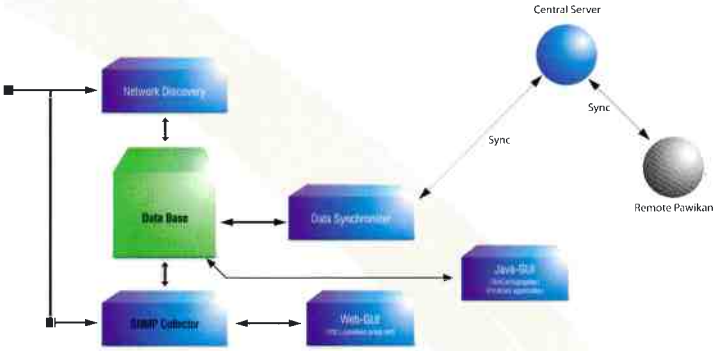
ASTI through PREGINET has developed a scalable Network Management system, which was named "Pawikan" in response to the unavailability of open-source software that could properly manage the growing PREGINET network. As part of the research and development efforts of ASTI, Pawikan aims to be used in the nationwide PREGINET network and also in commercial companies such as the big telecommunications companies in the Philippines which require a scalable and efficient network management system. With a distributed network management framework, Pawikan is composed of many features such as automatic network discovery, topology mapping, distributed data synchronization, fast data collector, and web-based user interface.

Trainings and Workshops Conducted

PREGINET-developed applications were promoted to partner institutions through a number of trainings and workshops conducted, such as:

- Technical Seminar/Workshop on E-learning Tools and Applications as part of the National Computer Institute's (NCI) series of online courses and trainings for state universities and colleges (SUCs) conducted at the National Computer Center-NCI on August 2 to 3, 2004
- Workshop on Virtual Classroom System conducted for Benguet State University on June 21 to 25, 2004

Pawikan Architecture

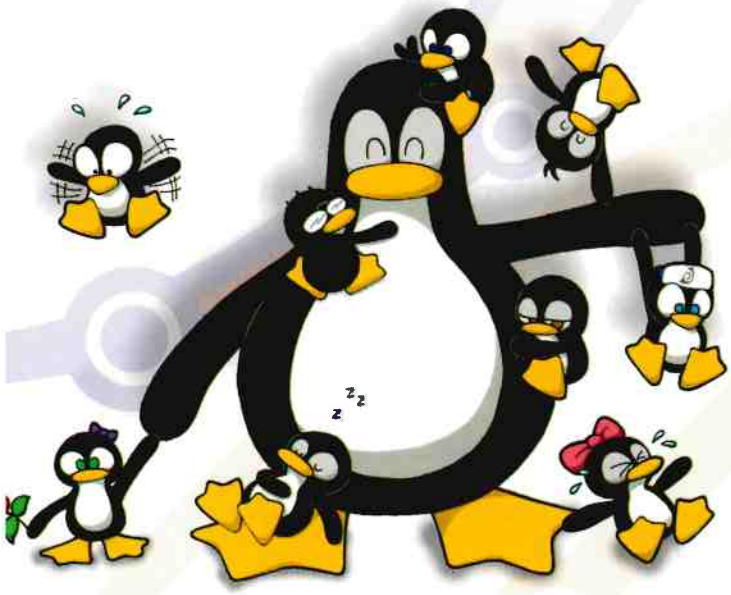


- Technology Transfer Workshop on Digital Content System and Library Management System conducted for the Commission on Higher Education (CHED) and CHED-Zonal Research Centers on June 16 to 18, 2004
- PREGINET E-learning Applications Workshop conducted for PREGINET partner institutions during the 1st R&E Network Symposium on May 25, 2004. The applications presented include videoconferencing, videostreaming/video-on-demand, and the VClass System.

Connectivity of Quirino State College and Nearby High Schools to the Philippine Research, Education and Government Information Network (On-going)

The project aims to provide assistance to Quirino State College (QSC) and the nearby high schools in their efforts to collaborate with other research and education institutions and participate in the different communities over the Philippine Research, Education and Government Information Network (PREGINET), the Research and Education network of the Philippines managed by ASTI and funded by DOST.

Quirino State College (QSC), Cabarroguis National School of Arts and Trade (CNSAT) and Quirino General High School (QGHS) are now connected to the PREGINET network, which paved the way for these educational institutions to be able to interconnect and collaborate with other institutions in the country and abroad. The connection of these institutions to the PREGINET network uses a combination of technologies. The connectivity from PREGINET Network Operations Center (NOC) located in Diliman, Quezon City to the Relay Station in Santiago, Isabela is via frame relay. From the Santiago, Isabela Relay Station, the connection to QSC in Diffun, Quirino is through



the use of wireless technology, and the interconnectivity of the different High Schools is through the use of ASTI's PC-Based Wireless Solution. The thrust now is for the said institutions to maximize the benefits of the connectivity and the adoption of networking tools, technologies and applications to enhance the learning activities that will benefit the academic community of Quirino and its nearby provinces.

Concomitant to the establishment of the interconnectivity is the conduct of training and an on-the-spot workshop to enhance the capability of the QSC technical staff for the maintenance and operation of the QSC network and in support of the applications that will be conducted over the network.

The project is funded by DOST's Philippine Council for Advanced Science and Technology Research and Development (PCASTRD) and implemented with the assistance of the Commission on Information and Communications Technology -Telecommunications Office (CICT-TELOF).

Bayanihan Linux: An Open Source System for Desktops (Completed)

In response to the Philippine situation, it became the mission of ASTI to assist government agencies, schools, and SMEs to reduce their dependency on expensive proprietary software and encourage local capacity building in software development. Through the financial assistance of DOST Grants-in-Aid Program and the monitoring support of the Philippine Council for Advanced Science and Technology Research and Development (PCASTRD), this project was implemented and gave birth to a more practical desktop solution named Bayanihan Linux (BL).

Bayanihan Linux is a desktop solution that is easy-to-install, easy-to-distribute, and is bundled with an interoperable office productivity suite, personal information management suite, and multimedia support. It is based on open source software, wherein the software and its programming code are freely licensed. The complete package includes an operating system, a word processor, spreadsheet program, presentation software, email facility, an internet browser, and a graphics editor. This complete system is packaged in a single easy-to-install CD.

The BL 3.1, the latest release, has the following features: (1) Graphical desktop; (2) Internet-ready; (3) Office productivity suite; (4) Windows emulation, file system and sharing support; (5) Multimedia playback of CD, MP3, DVD, VCD and AVI; (6) CD/DVD burning capability; (7) Educational applications; (8) Image editing tools; and (9) Better support for removable devices. The minimum system requirements to install the software are: Pentium II; 128MB RAM; 16MB Video RAM; and 4.3GB hard disk space.

Bayanihan Linux is gaining momentum. It has attracted major ICT companies by forming partnerships with Intel, GLEE Electronics, and Unison. ASTI's efforts in developing Bayanihan Linux was acknowledged by some members of the House of Representatives. Also, it received a good review from Distrowatch.com, an international website that compares and analyzes hundreds of Linux distributions, including Redhat, Mandrake, Suse, and Debian Linux. The team has rendered and ensured ample support for Bayanihan Linux users by providing many avenues for technical support, seminars for awareness, trainings, CD sales and free downloads. After conducting the seminars and trainings, the team received positive feedback from the participants. Most left with a positive attitude regarding open source software.

The Institute's efforts on Open Source will not stop here. The team believes that Open Source software such as Linux is a key solution to developing a low-cost and secure server. Not only is it community-based, but it is also free, cost-effective, reliable, and secure. Future research could focus on making Linux administration easier for novice Linux users without sacrificing security, flexibility, and performance, as well as on developing localized software.

Bayanihan Linux Terminal Server (BLTS) Project for Veritas Parochial School (Completed)

This project aimed to provide a Linux thin client computing system for the library of Veritas Parochial School. Toward this end, Linux Terminal Server Project (LTSP) technology was selected to run a system composed of diskless, cost-effective thin client computers networked with a powerful server. The system installed consisted of one server, five client computers, and one network switch. The ASTI project team provided technical support and conducted trainings for the school staff to enable them to run the system.

The utilities customized for the school were effectively utilized in the conduct of instructional activities. A lot of interest on the system was generated due to the installed office suite and several educational packages. The instructors used the office applications to store student records, compute grades, and prepare lesson plans and examinations. Other applications such as the preparation of online quizzes are yet to be explored by most of the instructors.

Commercialization of Bayanihan Linux Terminal Server Installer: An Open Source Thin Client Implementation – R&D Component (On-going)

The Bayanihan Linux Thin Client Manager (BLTCM) software is the main output of the R&D component of this TECHNICOM-assisted project. It is a cost-effective Open Source thin client solution with server-based management features for simpler installation/configuration and administration. This is based on the Linux Terminal Server Project (LTSP) technology, previously developed by the institute and pilot tested at the U.P. Diliman Department of Computer Science. The pilot testing activities in U.P. Diliman ended in March 2004. The LTSP system tested consisted of one server, 25 client computers, and one network switch. The system was used for instructional purposes, specifically in JAVA programming, UML programming using Poseidon, and testing of different programming languages. The LTSP system has also aided the faculty, students, and staff of the UPDCS in implementing research projects that deal with network performance and security.

The BLTCM Management tool will consist of the following: Installation Wizard, Server Management, Client Computer Management, System Monitoring, and Administrator's Guide. A BLTCM installation utility (in CD) will also be made available to enable automatic installation of LTSP and administration utility.

Pilot Testing of a Client/Server Set-up as a Low-Cost, Low Maintenance Computing System for Philippine Schools (Completed)

Through this joint undertaking with the DOST-Science Education Institute (DOST-SEI), networked computing systems were deployed in two pilot schools, namely, Itaas Elementary School in Muntinlupa City and San Bartolome High School in Novaliches, Quezon City. The project was officially launched in Itaas Elementary School on April 2, 2004 and in San Bartolome High School on September 28, 2004. Executives of DOST, the Department of Education, Office of the President, and city officials of Muntinlupa and Novaliches witnessed these two momentous events.

The systems deployed at both schools consisted of one server and fifteen (15) client computers, running on pre-installed Linux OS and educational applications including the Science and Math Educational Software provided by SEI. A switch, printer, and other necessary peripherals were also included in the set-up.

A series of training sessions in OpenOffice (word processing, spreadsheet, presentation, and drawing), Basic Linux Operations and System Administration, and Basic Computer Usage (CD Writing, Scanning, Printing, etc.) was conducted for system administrators and teachers of the two pilot schools. Aside from this, on site technical assistance has also been provided for them.

Client/Server Set-up as a Low-Cost, Low Maintenance Computing System for Philippine Schools (New)

Another pilot school, Muntinlupa Central School, was also selected by the Science Education Institute to be the third site for the testing of the client/server set-up. The Bayanihan Linux Terminal Client Manager will be deployed at Muntinlupa Central School. The schedule of system deployment and project launching in the said school will be finalized in 2005.

System Software Development for Wireless Mobile Devices (Completed)

This project began in November 2002 and was concluded last December 2004. Project deliverables that were accomplished include the Bayanihan Bluetooth Developer's Toolkit and its different applications and business models. Efforts were undertaken, through a nationwide roadshow, to advocate knowledge and awareness of technologies that would serve as possible areas for future software development and for the advancement of Bluetooth technology in the Philippines.

This project was proposed with the skills enhancement of local developers in mind. Hence, one of the project objectives was to support the Filipino wireless system developers by providing access to low-cost, high-quality development tools. It also aims to promote Open Source Development to the Filipino community, by establishing a virtual community of developers to facilitate the exchange of ideas and technology transfer.

After more than two years of implementation, the project operation finally came to an end. As of December 31, 2004, all activities and deliverables were officially completed. One of the major deliverables that was accomplished in pursuit of the project objectives was the development of the Bayanihan Bluetooth Developer's Toolkit (BBTDTk), an Integrated Open Source Bluetooth Solution for local developers. This solution includes an open source protocol stack, sample applications, a hardware platform, and a user's manual. The stack, sample applications, and user's manual were bundled in a CDROM entitled "Bayanihan Linux Bluetooth Developer's Edition."

In order to demonstrate the functionality of this integrated solution, some sample applications were developed. These included the ASTI Kit Identity Checker (KitChecker), BT Neighborhood, BT Chatter, PCStorage, and BlueBillboard. The KitChecker and BTNeighborhood were developed using existing linux distributions, RedHat 8.0 and RedHat 9.0. Bayanihan Linux v2.0, an Open Source-based desktop solution

also developed by ASTI, was used for the development of the BTChatter and PCStorage. Lastly, the BlueBillboard was developed using the Bayanihan Bluetooth Developer's Toolkit.

Since BlueBillboard came out to be the most promising application, project efforts during the second half of 2004 were focused on the enhancement and field testing of this software application. With the BlueBillboard, users can share their pictures in their cellphones by sending them via Bluetooth to the host computer. They can also send messages. The received picture or message is displayed on a screen that can be viewed by everyone. The users can also see other available devices in the area through the "scanned devices" frame.

To fully test the BlueBillboard, several deployments were made during TechBlitz 2004 (one of the events of the ASTI anniversary celebration) in Makati City; WOW Philippines Centennial Celebration in Intramuros, Manila; National Science & Technology Week in Legazpi City, Bicol; and at the Philippine Association of National Advertiser (PANA) Convention in Mandaluyong City. The feedback were used as input in refining the functionality of the software.

The development of a business model for BlueBillboard was another concern of the project. After consulting the possible users of this product, it was decided that the Service Model is the most appropriate business model for BlueBillboard because of the changing requirements of events organizers who are the primary users of the product.

Advocacy is also a vital part of the project since one of the reasons why there are few developers for Bluetooth Technology in the country is the lack of awareness of the potential of this technology. To address this issue, the team conducted trainings and seminars in the different regions of the country. Aside from serving as a venue for the exchange of ideas and for technology transfer, these activities enabled the team to advocate knowledge and introduce some technologies that can be considered as possible areas for software development in the future. Likewise, a developers' mailing list and website were created to host a virtual community of developers and to enable them to interact with each other by posting their questions and sharing their outputs. Conference papers were also submitted and presented, and consultancies were conducted primarily for students of different universities who were doing their theses or projects.

Finally, the project came up with a business plan which shows that both the development of applications and the conduct of trainings may be used as ways to advance Bluetooth Technology in the Philippines. This plan was prepared to help the developers in their decision-making with regard to marketing strategies and applications development. They can also use the results of this study in coming up with market-driven products and services.

Radio Frequency (RF) Microelectronics for Wireless Technologies – Phase II: Development of Advanced Broadband Wireless System (On-going)

During the year, the project sought to respond to the demand for capability enhancement of the local S&T manpower through services rendered to SMEs and government institutions. Efforts were likewise geared towards contributing to the enhancement of the academe and the achievement of excellence. The project's wireless system development endeavors, on the other hand, focused on developing the marketability of the broadband wireless system.

The project was able to provide assistance to some small and medium scale enterprises (SMEs) involved in electronics and semiconductor manufacturing as well as to some government institutions. ASTI finished the technical scoping of possible projects with Micrologic and Ionics, rendered consultancy services to Innovatronix regarding its transmitter and receiver designs, and completed a contract research project with EAZIX and RGI which focused on antenna arrays. Similarly, the team provided wireless connectivity to PCHRD's 4th Health Research for Action National Forum.

On the R&D aspect, the prototype production and testing of the RF transceiver kit is still on-going. This training kit consists of general-purpose wireless system components and practical design tools needed to conduct hands-on experiments with wireless transmission technologies. The kit was used in the development of training modules and laboratory experiments, which can eventually be adopted by the universities to enhance the instruction of wireless courses. Corollary to this, the development of training modules for specialized topics on wireless communications and RF design was also targeted by the project. Topics that were selected include: 1) Microstrip

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also interesting to note that the development of information systems that can be used to monitor purchase requests (PR) as well as the supplies inventory has already been initiated. These will form part of the Inventory System. Finally, a program and project archive module of the Project Management System were also initiated.

Aside from InfoSys development, the team also carried out some technology diffusion activities. The Document Tracking System (DTS) was presented to the Philippine Council for Agriculture and Natural Resources Research and Development (PCARRD) while the Personnel Management System was demonstrated to the Philippine Science High School (PSHS). The proposal pertaining to the implementation of the DTS at PCARRD in order to be able to automate the routing and tracking of their documents, has already been approved.

Moreover, the team took the lead in the Open Source migration of the majority of the ASTI staff as well as the network repair and maintenance. A new computer laboratory was also set up and made operational. The new and dynamic ASTI website was also made possible through the efforts of the group.

Another critical task of the MIS group was the management of the Domain Naming Service (DNS) for the .gov.ph domain. In 2004, the DNS applications received amounted to 2,084. Of this number, a total of 1,080 were created, 542 were modified, and 432 were deleted. To make the DNS service more accessible, secure, and easier to use, online registration was reactivated. Some features were incorporated in the DNS application system to ensure the security of data/information.

DOST ICT Project (New)

In December 2004, ASTI was tasked by DOST to manage and implement the DOST ICT project. This project is a continuation of the DOST-initiated project entitled "Strengthening the DOST Management Information System and Information Delivery Infrastructure." The project seeks to direct and advance the effective use of ICT for the enhancement of DOST's internal operations and front-line services. It is intended to strengthen the Department's ICT infrastructure and to concurrently empower its personnel for the effective use of ICT through appropriate training.

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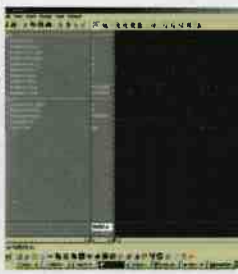


mplementation of this project under the
ent of previous agencies focused on the DOST
on Infrastructure, Information Systems Development
nnel Training.

er ASTI management, the project shall focus on
e the areas of Software Applications, Network
ent & Services, Network & System Security, and
ion & Trainings. Included in these activities are
yment, review, enhancement and the continuing
nce of the Information Systems (HRMIS, ProMIS,
Technology Experts Database System, Document
System for DOST, and Electronic New Government
g System or e-NGAS). ASTI shall also undertake the
ent, operation, maintenance, and improvement
sting DOST network infrastructure, extending the
n of the DOST network to all regional offices and
its Internet services.

as the project's proponent, shall be responsible for
g the coordinator and key trainers who will facilitate
ry of trainings in order to upgrade the ICT knowledge
ersonnel. ASTI will also spearhead the creation of a
and Network Security Incident Response Team (IRT)
andle ICT security-related issues in the DOST.

pment of Computer-Aided Instructions nce and Mathematics (New)

newly initiated project with the Science Education
SEI) aims to develop Computer-Aided Instruction
erials for Science and Mathematics that can be used
ts in the Grade 5 and Grade 6 levels. A total of 42
s running in both Microsoft and Linux operating
re expected to be designed and developed within
-month project duration. The accomplishments so far
sed on the development of the Science courseware
6. Since the development effort has just started, this
nal material is only approximately 25% complete.

Microelectronics R&D Program

Microelectronics Design for Philippine Electronics Industry, An Essential Component for Global Competitiveness: Digital, Analog and Mixed Signal Components for Signal Processing and Wireless Applications (On-going)

In pursuit of the enhancement of the competitiveness of the Philippine electronics industry, the program's efforts during its fourth year were directed towards the development of technical capability through the conduct of research and development. Knowledge acquired from R&D was transferred to the academe and the industry through training and consultancy. Such services were rendered in furtherance of the project's aim to help local companies venture into design and move up the value chain by cultivating a skilled workforce adept in IC design, through training and exposure to actual design work.

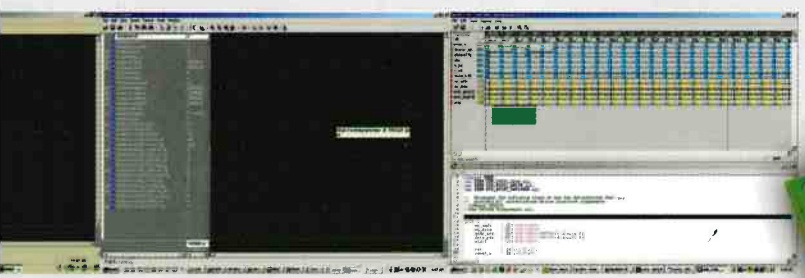
Assistance to SMEs

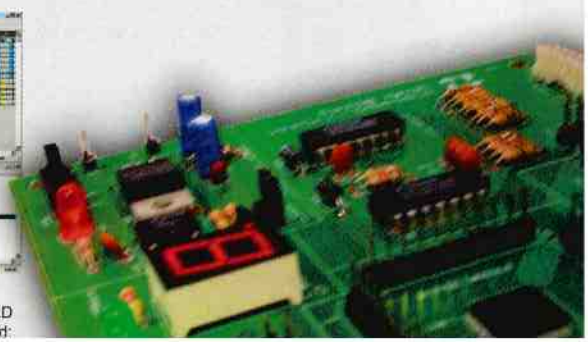
Two versions of the controller for the dental light cure device, and the dental chair foot pad were developed for Soniford Maeller Corporation. Soniford employees were also trained on how to program the PIC micro-controller.

Symphony Consulting utilized the OpenLab facilities, specifically the Field Programmable Gate Array (FPGA) development system. Consultancy services regarding FPGA design were also rendered. FPGA-based design methodology was discussed in line with the company's plan of venturing into digital design services.

R&D Activities

Studies done in Analog and Mixed Signal (AMS) and Digital aspects of Microelectronics design resulted in the design of an 8-bit Successive Approximation Register Analog





ASTI's FPGA/CPLD development board:

to Digital Converter (SAR ADC) and 4-bit Flash ADC and the fully verified integration of the Very High Speed Integrated Circuit Hardware Description Design Language (VHDL) model (post Place and Route (PAR) simulation) of the Direct Memory Access Controller (DMAC) module, Universal Asynchronous Receiver/ Transmitter (UART) module and the Advanced Peripheral Bus (APB) bridge.

The project has also produced Field Programmable Gate Array/Complex Programmable Logic Device (FPGA/CPLD) development boards which may be used to download and test digital designs for fast prototyping. The boards show market potential, particularly in engineering schools and universities.

Knowledge transfer efforts are currently geared towards the development of modules for Distance Learning Courses. A handbook on the "Best Practices in FPGA-Based Designs" is also concurrently being developed. This handbook is intended to be made available for local designers to assist them in the establishment of a strong design methodology and, ultimately, to bring about improvement in the design process.

Linkages with the Industry

A Memorandum of Agreement between ASTI and the Advanced Research and Competency Development Institute (ARCDI), granting ARCDI the non-exclusive right to use the Openlab Training Series Materials, was signed last November 5, 2004. The agreement covers training materials on "Introduction to Very High Speed Integrated Circuit Hardware Description Design Language (VHDL)" and "Programmable Logic Based (FPGA/CPLD) Design Flow."

ASTI Deputy Director Denis F. Villorente and ARCDI Executive Director Cesar L. Quiason at the signing of the MOA for the OpenLab Training Series Training Materials

ASTI is a member of the Electronics Industries Association of the Philippines, Inc. (EIAPI), and the Semiconductor and Electronics Industries in the Philippines, Inc. (SEIPI), and it is involved in the initiatives of other government agencies such as the Department of Industry – Board of Investments (DTI-BOI) to help upgrade the capabilities of the local electronics companies.

Seminars Conducted

Pursuant to the project's objective of transferring knowledge acquired through R&D to the industry and the academe, the following seminars were conducted:

- "Introduction to Full-Custom Digital Integrated Circuit (IC) Design Flow" training conducted at the Mapua Institute of Technology (MIT) on June 8 to 10, 2004, with 13 participants from various schools in the Visayas region

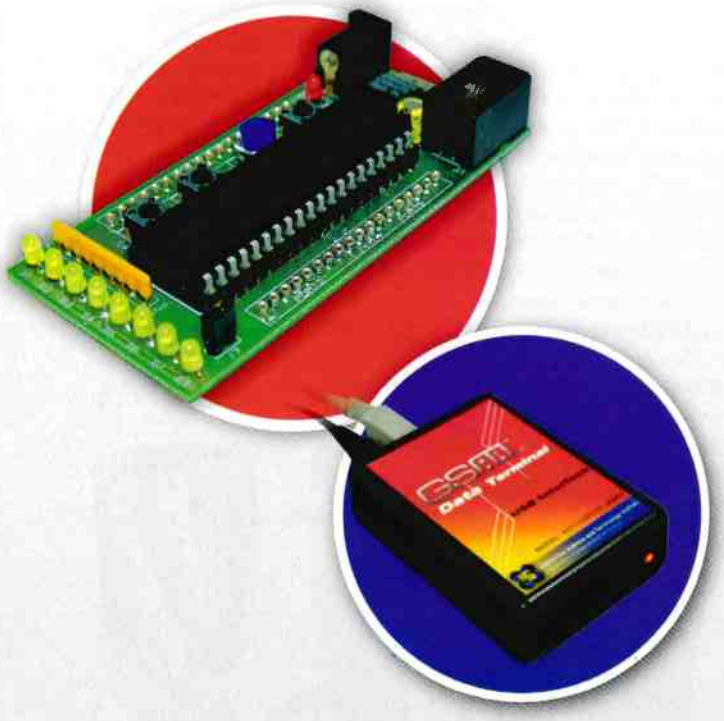
- "Programmable Logic-Based Design Flow" training conducted at the Cebu Institute of Technology (CIT) on July 15 to 17, 2004, with 17 participants from various colleges and universities all over the country

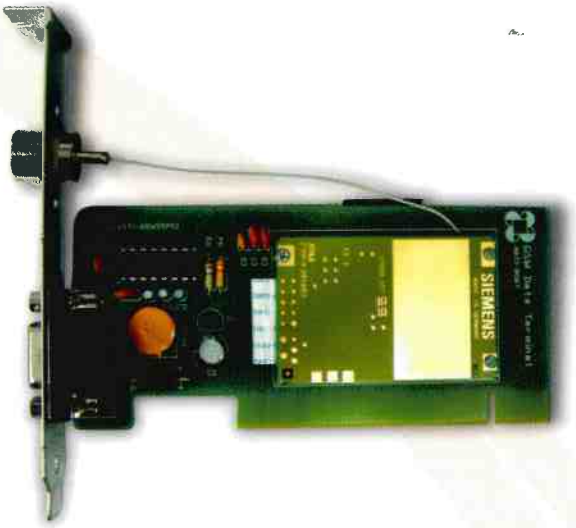
- "Digital Analog Integrated Circuit (IC) Design Curriculum Transfer and Development Program", a summer immersion program conducted at the University of the Philippines Electrical and Electronics Engineering (UPEEE) Department MicroLab from April 26 to May 21, 2004, with five (5) faculty members from the De La Salle University and 10 staff members of the ASTI Microelectronics Division as participants.

Embedded Systems Development (On-going)

ASTI's Embedded Systems Group was primarily involved in product/system development. For 2004, the team's activities focused on the development of the following products:

- Digital multimeter
- Pasteurizer
- RF training kit
- PIC development kit
- Network-enabled devices using the Rabbit microcontroller/ethernet module
- Network-enabled devices using the ASTI Embedded Ethernet module
- GSM data terminal
- GPRS and MMS enhancements for the GSM Data Terminal
- Telemetry prototype
- Upgrading legacy RS-232 devices to USB
- Micrologic PCI parallel port
- Firmware and hardware development for seismic monitoring and recording
- Voice over Internet Protocol or VoIP on Host Access Point
- Embedded Wi-Fi AP platform
- Example Multimedia Client-Server Application for Linux
- Embedded Linux on StrongARM platform
- Linux device drivers





Of these products, the GSM Data Terminal was considered to be one of the most promising outputs of the team. This technology is designed to Short Message Service (SMS)-enable the information system of different applications, which may include: 1) Reporting/requesting information from the server via SMS; 2) Programmed sending of SMS to individual or group recipients; 3) Machine-to-machine communication. Once the product is installed, computers will have the ability to send and receive text messages just like an ordinary cellular phone. It is customizable and it allows the clients to make their own applications. It uses any mobile phone SIM card and there is no need for an Internet connection. The GSM Data Terminal will give companies the convenience of wireless access to different information using mobile phones. It will lead to limitless SMS applications, depending on the companies' needs and usage.

The capabilities of the GSM data terminal have also been extended. Aside from SMS or text messaging, it provides the attached host computer with GPRS connectivity and Multimedia Messaging Service (MMS) capability. The GPRS/MMS-enabled terminal can now connect to the internet via GPRS, and programmatically send and receive MMS messages.

So far, units of the GSM terminal are being used at the Philippine General Hospital – Medical Informatics Unit, Wi-Konek, and Department of Social Welfare and Development. Other organizations and companies like Alliance for Mindanao Off-Grid Renewable Energy (AMORE), Lemongreen, MAYNILAD, National Meat Inspection Commission (NMIC), Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD), and Philippine Institute of Volcanology and Seismology (PHIVOLCS), have also expressed interest on this GSM product. A series of product demonstrations were conducted for these potential technology adoptors.

Technology Transfer Program

Technology Commercialization

The Technology Incubation for Commercialization Program (TECHNICOM) Program was implemented by the DOST with the aim to create mechanisms to fast track the commercial application of innovative technologies developed by the S&T community. It was designed to facilitate technology-based spin-offs. Under the program, tie-ups with universities for the incubation and commercialization of creative works or R&D outputs are established and strengthened. The Institute has four projects that received funding and support from the TECHNICOM. These are:

Development and Commercialization of a Digital Multimeter (On-going)

The development of the Digital Multimeter in cooperation with Yongden Technologies Corporation (YTC) is still in progress. Among the activities conducted were: 1) submission of scaled case design by ASTI to YTC; 2) prototype board design and layout; 3) submission of actual PCB layout and dimensions to YTC; 4) board stuffing; 5) revision of the casing mold; and 6) prototype testing and debugging. The development and commercialization efforts, which were expected to be completed last October 2004, were extended until March 2005. The project experienced some delays due to the unavailability of a local support industry that can provide the required tooling and liquid crystal display, which were outsourced abroad.

Commercialization of a Locally Developed Human Breast Milk Pasteurizer (On-going)

The Human Breast Milk Pasteurizer is a device that kills harmful bacteria present in milk due to its mishandling and unsafe storage. Existing commercially available pasteurizers are expensive and are mostly designed for medium to high-volume operations. They are not suitable in situations where breast milk donations are limited. These foreign made pasteurizers are therefore unable to address the low-capacity requirements of the majority of our medical institutions and health care clinics, particularly in the provinces.

In response to this need, a local human breast milk pasteurizer was developed by ASTI in cooperation with the Philippine Children's Medical Center (PCMC) and the Alay Gatas Foundation. The ASTI-developed pasteurizer provides a satisfactory and affordable alternative to foreign made pasteurizers. It is a suitable

solution to the problem of indigent mothers who are unable to lactate. They would be able to feed their children with breast milk obtained from donor mothers.

The Philippine Children's Medical Center is already using two versions of the ASTI-developed pasteurizer. A third version is currently being prepared for integration and testing. The prototype vessel has been fabricated by the Metals Industry Research and Development Center (MIRDC) of the DOST, requiring only a few adjustments for the installation of the controller board and for testing.

Other uses and users of the breastmilk pasteurizer may also be explored in the future. The same technology employed in the version for hospitals could be modified to serve other markets, such as homes and small-scale farms.

Commercialization of a Locally Developed PC-Based Access Point Deployment Kit (Completed)

The PC-based Access Point Deployment Kit developed by ASTI is a cost-effective, reliable and secure broadband wireless access point that runs on the Linux operating system. It works seamlessly with laptops, desktop computers, and PDAs. It allows the users to save on cost through the reuse and conversion of old PCs to access points. It may be configured as the center point of a standalone wireless network or as a vital connection link between existing wired networks and "last mile" wireless networks. The access point supports data rates up to 11 Mbps and is IEEE 802.11b compliant.

To fully test the performance of the system, deployments in both rural and commercial areas were done. Bicol University in Legazpi City and Quirino State College in Quirino were selected as rural test sites, and the Philippine Long Distance Telephone Company was chosen as the commercial site. Testing was also conducted in some special events such as the ASTI TechBlitz held at Hotel Intercontinental in Makati City, and the National Science and Technology Week exhibit in Legazpi City.

Commercialization of Bayanihan Linux Terminal Server Installer: An Open Source Thin Client Implementation – Technology Transfer Component (On-going)

The deployment of the Bayanihan Linux Thin Client Manager software, which is the main output of this project component, went full-blast and was set-up in a number of schools and academic institutions. Other services were likewise provided to support its implementation in these schools including: student training on basic troubleshooting; teacher training; and technical support.

The project also participated in the following exhibits/events:

- Launching of Low Cost Low Maintenance Computing System for Philippine Schools (Elementary Level) in Itaas Elementary School, Muntinlupa City on April 2, 2004
- Teachers Training Roadshow in San Bartolome High School on April 26 to 27, 2004 and Itaas Elementary School on April 28 to 29, 2004
- Independence Day Exhibit on June 5 to 15, 2004
- Launching of Low Cost Low Maintenance Computing System for Philippine Schools (Secondary Level) in San Bartolome High School, Novaliches Quezon City on September 28, 2004

Technology Diffusion

A number of ASTI-developed technologies, products, applications and services were promoted, advocated, demonstrated and/or deployed to prospective adoptors. Some of these technologies include the ASTI Bluetooth Technology/ iBillboard; GSM Data Terminal; and PC-Based Access Point. Products include the Bayanihan Linux ver. 3 CD; Bayanihan Linux Live CD; and BLTS. Applications diffused, on the other hand, include Netmon ver. 1; Virtual Classroom System; Digital Content Management System; Netmon Pawikan; and Library Management System. Meanwhile, ASTI online services such as PREGINET connectivity; videoconferencing and videostreaming technologies; and the Access Grid continue to be among the Institute's most in-demand services.

Technical Services

A total of 2,084 technical services were rendered by the Institute for the year. The services provided comprise of .gov.ph domain registration; photoplotting and PCB fabrication; PREGINET connection; server co-location; webhosting; videoconferencing and videostreaming; Digital Content Management System installation; networking and other installation services.

Government, academic, and private institutions that sought these services include: UP Baguio; Iligan City Government; NAMRIA; National Computer Center-National Computer Institute; League of Provinces of the Philippines; National Historical Institute; PCAMRD; PCARRD; PCHRD; STAC-Japan; DA-BAR; DENR; UP Manila – College of Medicine; CHED; CHED Zonal Research Centers; BSU; MSU-IIT; ASTEC; Symphony Consulting; CICT-TELOF; House of Representatives; PNRI; The National Library; and the International Rice Research Institute.

Trainings and Seminars

ASTI is steadfast in its commitment to make appropriate technology and information available to customers in the academe, industry and government. In pursuit of this commitment, a total of 33 trainings, seminars and fora were conducted in 2004. The topics covered by the trainings include:

- Basic Linux Operations;
- Open Office Applications;
- Full Custom Digital IC Design Flow;
- Wireless & Wired LAN Installation and Operation;
- Multimedia over IP;
- Digital Content System and Library Management System;
- Philippine eLibrary Project; VClass/IVLE System;
- Bluetooth Applications Development; and
- Programmable Logic-Based Design Flow

Techblitz talks on the following technologies and products were likewise conducted:

- TQM for Electronics Manufacturing;
- Technology Marketing;
- Technology Licensing;
- Technology-Based Entrepreneurship;
- Elements of Good Product Design;
- Bayanihan Linux v.3;
- ASTI's Bluetooth Efforts;
- PC-Based Access Point;
- Open-Source Computing Technologies;
- GSM Product talk;
- Open-Source Embedded Technologies; and
- Open-Source Networking Technologies

These trainings, seminars, and fora were participated in by around 548 students, faculty members, and other individuals from the government and the industry.

Consultancy Service

A total of 693 clients were served through the various consultancy services rendered by ASTI throughout the year. Private companies such as Micrologic, Ionics, Amkor Anam, Covenant, Innovatronix, Borromeo Group of Companies, Yongden Technologies, and Symphony Consulting, sought ASTI's technical advice on various areas of Microelectronics and ICT.

The Institute likewise provided technical consultancy to various clients from the government and academic sectors

on: Linux Terminal Server; Wireless Communication; Network Design and Infrastructure; Digital Content System; Proxy System; PREGINET Connection; Bayanihan Linux 3; FreeBSD Installation and Web Proxy Configuration; GSM Data Terminal; Seismic Monitoring and Recording; and the ASTI Information Systems.

Contract Research

As a means to extend its technical expertise to other government, academic, and private institutions, ASTI carried out partnership projects through contract research. For 2004, the Institute completed a total of four (4) contract researches.

The Bayanihan Linux Terminal Server Project for the Veritas Parochial School (VPS) was concluded last September 2004. An LTSP setup was initially deployed to this school in September 2003 in order to assist VPS in spearheading the development of their computer literacy program for their primary and secondary level students. The LTSP setup enabled VPS to effectively expose its students to new technologies, with reduced cost in terms of hardware and software.

Also completed was the Pilot Testing of the Client/Server Setup as a Low- Cost, Low-Maintenance Computing System for Philippine Schools project. Two schools served as the testing sites for this project: Itaas Elementary School and San Bartolome High School.

The two versions of the Dental Light Cure Device for Soniford Maeller Corporation have been completed.

ASTI also undertook a project with Eazix Incorporated, involving the development of antenna array prototypes designed by RGI.

Currently, two contract research projects are underway. One is the project entitled "Development of Computer-Aided Instruction for Science and Mathematics," in partnership with the DOST-SEI. The project began on October 2004. The development of the third version of the Dental Light Cure Device for Soniford Maeller Corporation is also expected to be completed in 2005.

AREA/ INDICATOR	NUMBER / QUANTITY
Contract Research Projects	6
Technology Transfer Engagements	30
Diffused (Potential Adopters)	24
Commercialized	6
Number of Adopters	8,006
Diffused (Potential Adopters)	7,875
Commercialized	131
S&T Services Rendered	2,767
Consultancy	693
Technical Services	2,074
Clients Served	2,767
Consultancy	693
Technical Services	2,704
Number of Trainings/Seminars Conducted	33
Number of People Trained	549

Events

Three main events provided ASTI great opportunities to demonstrate its research and development projects to the S&T community as well as the IT industry. These events were a good venue for ASTI to establish linkages and acquire potential clients and/or partners in its products and services.

▸ The National Science and Technology Week (NSTW) 2004

ASTI participated in the celebration of DOST's National Science and Technology Week (NSTW) from July 21 to 26, 2004 at the Casablanca Hotel, Legaspi City, Albay.

Several ASTI technologies and products were showcased during the event through display boards, flash presentations, computer demonstrations, promotional materials, and displays of fabricated modules and printed circuit boards. The technologies and products on display were: Bayanihan Bluetooth Developer's Toolkit; Bayanihan Linux Desktop Solution (BL version 3); Bayanihan Linux Terminal Server (BLTS);

PC-Based Access Point; GSM Data Terminal; Digital Multimeter; Breastmillk Pasteurizer; and initiatives and activities under ASTI's Microlectronics R&D Program.

PREGINET facilities were used in the conduct of the DOST National Press Conference with the different regional sites and science communities through videoconferencing. PREGINET also videostreamed the week-long NSTW proceedings, technofairs, and programs.

▸ 1st Philippine Research and Education Network Symposium and 2nd PREGINET National Partners' Meeting

The "1st Philippine Research and Education Network Symposium and 2nd PREGINET National Partners' Meeting" was held on May 24 to 26, 2004 at the Montebello Villa, Cebu City.

The Network Symposium comprised of technical talks on the PREGINET network infrastructure, as well as the various applications developed through the project such as: Network Usage Policy; High Availability Proxy System; Internet Protocol version 6 (IPv6); Network Monitoring System; and Digital Content System. A technical workshop on e-Learning tools and applications such as videoconferencing and videostreaming/video-on-demand and Virtual Classroom (VCLASS) System was also conducted.

The 2nd PREGINET National Partners' Meeting focused on the initial activities towards the formalization of the PREGINET through the selection of the members of the PREGINET Interim Policy Board, and the reinforcement of the community of users over PREGINET. The PREGINET Sustainability Plan served as the discussion point for the newly-selected members of the PREGINET Interim Policy Board.

ASTIDay 2004

ASTI dubbed its 17th year Anniversary celebration as TechBlitz 2004: Forging Partnerships for the Business of Technology. It was aimed at providing a venue for the interaction of entrepreneurs, technologists, decision-makers, and IT enthusiasts in the country. Aside from showcasing ASTI's products and services, TechBlitz 2004 was envisioned to provide the venue for the "Philippine Silicon Valley" – where people come in with an idea, a technical capability, a need that must be answered, or a willingness to invest in technology, and eventually going out of the event with new contacts, a more defined direction, and added enthusiasm.

The event, which was held on February 26, 2004 at the Hotel Intercon in Makati City, was well-attended by representatives from the industry, government, academe, and the research communities. The different tracks that were conducted during the whole-day event were well-attended. Talks on Product Development and Technology Management, and on Open Source Technology, which includes the presentation of ASTI's Technology Roadmaps, elicited the most interest among the participants. The launching of the Bayanihan Linux version 3, an Open Source desktop solution developed by ASTI, was also among the highlights of the event.

Exhibits

ASTI also showcased its products and services through participation as exhibitor or resource persons in a number of national and local events, conferences, and exhibits throughout the year. Some of these events include: Independence Day 2004; Philippine Open Source Conference 2004; CSIT Week Celebration of the Asia Pacific College; 1st Philippine Research and Education Network Symposium and 2nd National Partners' Meeting; and E-Services, among others.

Papers Published

- "Pawikan: A Scalable Network Management System for Small, Medium and Large-Scale Networks," AI3 Autumn 2004 Meeting, University of San Carlos – Talamban Campus, October 7, 2004
- "ASTI's Bioinformatics Initiative: Knowing APBioBox and SunBioBox the Easy Way," 1st Annual Bioinformatics Conference, International Rice Research Institute, October 15, 2004
- "Access Grid Technology: Building Collaborative Environments," AI3 Autumn 2004 Meeting, University of San Carlos – Talamban Campus, October 7, 2004
- "Network Management Utilizing Open Source," Open Source Conference, EDSA Shangri-la, August 19, 2004
- "BlueBillboard: A Real-time Social Software Utilizing the Bluetooth Wireless Technology," Mobility Conference 2004.

The following papers were presented at the National ECE Conference held last November 25-27, 2004 at the Mapua Institute of Technology. They were published in the December 2004 issue of the Philippine Journal of ICT and Microelectronics (PJICTM).

- Design of a Flash Analog-to-Digital Converter in 0.35 um CMOS Process
- Design of a Capacitive Successive Approximation Register (SAR) Analog-to-Digital Converter in 0.35 um CMOS Process
- FPGA Implementation of a StrongARM-Based 512-Byte Write-Back Cache Verified Using An Input Transaction Generator
- FPGA Implementation of a 32-Bit AMBA-Based Direct Memory Access Controller
- Pawikan: A Scalable Network Management System for Small, Medium and Large-Scale Networks

The following were also published in the December 2004 issue of PJICTM:

- VHDL Coding and Synthesis Techniques and Optimizations as Applied to an FPGA Based (255,223) Reed-Solomon Encoder and Decoder
- Proposed Application of Reuse Methodology on a RISC Microprocessor Prototype
- Intellectual Property Rights in Nanotechnology
- A Standard-Cell-Based ASIC Implementation of an 8-bit Arithmetic Logic Unit
- Electric VLSI Design System: A Tool for Developing Microelectronics in Local Universities
- Setting up a Single and Double-Sided Printed Circuit Board Prototyping Facility

CHALLENGES AND DIRECTIONS

Throughout the years, the demand for ASTI to provide a more significant contribution to national development through Information and Communications Technology (ICT) and Microelectronics has increased. The Institute's functions and programs have become more relevant in this very dynamic era, which is characterized by rapidly changing and evolving technologies.

With this, ASTI has to be strategic in its plans, taking into consideration the additional requirement of the national government to streamline and review organizational performance, and to provide a more customer-centered proactive organization. The Institute recognizes the need to establish an organizational structure that will enable it to provide more focus on its programs and, at the same time, contribute significantly to the community – the government, academe, and industry.

For 2005, ASTI will be undergoing changes that are expected to bring about a more efficient and service-oriented organization. The Institute's strategic goals are as follows:

- To be financially independent;
- To be recognized as a leading research institute in ICT and Microelectronics;
- To be a recognized source of technical solution experts;
- To be known as a learning and highly innovative organization; and
- To provide cost-effective and on-time delivery of solutions to clients.

The new organizational structure will be composed of the Office of the Director (OD); Finance and Administrative Division (FAD); and the four (4) technical divisions, namely: the Research and Development (R&D) Group, the Solutions and Services Engineering (S2E) Group, the Knowledge Management (KM) Group and the Special Projects Group.

The R&D Group will undertake relevant, innovative and useful research programs in the areas of ICT and Electronics. It also aims to continuously increase the inventory of qualified staff and enhance the required competencies and infrastructure; establish mutually beneficial linkages and partnerships with other research organizations locally and abroad, and obtain grants and contract research projects for funding of research activities; and contribute in ensuring the viability of the agency.

The S2E Group will become the center for contracted engineering and design work and will be tasked to handle, support and market various solutions and services. It will be composed of the Solutions Engineering Team and Engineering Services. It will develop or improve existing prototypes and products to meet customer requirements; implement effective project management capability with continuing process improvements to ensure timely and cost-effective delivery of solutions and services; generate optimum revenues through commercialization of products and services; increase market and product/service base through aggressive sales and marketing efforts; and increase ICT and Electronics knowledge through effective sharing of ASTI expertise with partner institutions.

The KM Group is created for the purpose of increasing ASTI's available intellectual capital and to enable the institute to continuously improve its performance through the re-use of its intellectual capital. It will be tasked to handle the development of an appropriate knowledge culture within the agency; improvement of the knowledge infrastructure to support the KM strategy; codification of all value creating and support processes and the benchmarking of these processes against best practices for continuous improvement; and protection of the agency's knowledge assets.

The Special Projects Group will work on projects that will require additional focus because of the opportunities that these projects will provide to ASTI. The group will identify customer requirements and system specifications not covered by the other technical divisions. It will also look into packaged solutions and handle other related requirements of the specific projects identified. Initially, the group will handle the implementation of projects relating to E-Governance with the aim of enabling easier access of government services to the general public.

The FAD will provide financial, administrative and general support and other necessary services for the welfare of the agency and its staff.

The OD will handle the overall agency management. It is tasked to provide effective leadership to the organization; properly manage the agency to achieve its targets; continuously identify potential partners and allies; implement project management systems to ensure that solutions meet client expectations; conduct regular assessment of the competencies required by the agency to achieve its mission; develop and implement competency acquisition and building programs for the staff; maximize funds and grants to support the agency projects; develop and implement revenue generating programs to increase funds available for R&D; formulate and implement an effective Communication Plan to ensure that appropriate target groups become familiar with ASTI's capabilities; and regularly conduct surveys to determine how well ASTI is meeting its goal of establishing the image and reputation of being a leading R&D institution in South-East Asia.

With these tasks ahead, the Institute is determined to handle the challenges and opportunities that come with the implementation of this reorganization plan.


Why
Bioinformati

Scientific Linkages and Institutional Cooperation

The Institute establishes and maintains scientific linkages and promotes institutional cooperation with other international research and education networks such as APAN, AI3, and TEIN2, and participates in their initiatives to provide more opportunities and an enhanced research environment for the Philippines' researchers in the diverse fields of science and technology and other areas of study.

Participation in the APAN Meetings and Collaborative R&D Initiatives

The Advanced Science and Technology Institute continues to strengthen its active participation in collaborative R&D initiatives with other international research and education networks. Through the Philippine Research, Education and Government Information Network (PREGINET), the Philippines is represented as a primary member in the Asia-Pacific Advanced Network (APAN), an international R&E network that coordinates and promotes an advanced networking environment for the research and education communities in the Asia-Pacific Region. ASTI actively participates in APAN meetings and conferences and collaborates in its initiatives on development and deployment of network-based applications for agriculture, natural resources, disaster management, and advanced networking technologies, among others.

The Institute participated in the APAN Meetings held in Honolulu, Hawaii on January 25 to 30, 2004 and in Cairns, Australia on July 2 to 7, 2004. The conferences held discussions on advanced networking technologies, high performance applications and other research and education initiatives in the Asia Pacific region. These conferences also serve as the venue to encourage and promote global cooperation.

Currently, PREGINET maximizes its APAN connection with its participation in the Global Access Grid activities that include the Supercomputing Global Conference 2004 held on December 9, 2004. Access Grid is an advanced networking application conducted over PREGINET that provides large-scale collaborative spaces where geographically distributed sites interactively participate in group meetings, seminars, lectures, tutorials and trainings, and engage in informative discussions and research.

Plans are underway to upgrade the PREGINET's 6Mbps direct connection to APAN, which is being funded by the Ministry of Agriculture, Forestry and Fisheries Research Network (MAFFIN) of Japan, to handle more content, applications and activities over the network.

Participation in the AI3 Conferences and Collaborative R&D Activities

Another international research and education consortium of which ASTI is a member, is the Asian Internet Interconnection

Initiatives (AI3). This is an international research consortium which aims to provide an open Internet testbed for the research and academic community in Asia. It intends to promote the sharing of expertise and knowledge among researchers and engineers in Internet technologies to accelerate local Internet development and to develop technologies and applications for the benefit of the Internet community.

ASTI, through PREGINET, also actively collaborates with AI3 on initiatives on advanced networking technologies and applications. The applications that PREGINET conducts over the AI3 network include: the Internet Protocol version 6 (IPv6); videoconferencing and videostreaming; Digital Content System and Library Management System; Virtual Classroom (VCLASS) System; Network Monitoring System; participation in the School-on-the-Internet Asia (SOI-Asia) activities and lectures; and other networking applications. PREGINET's connection to the AI3 network consists of a 1.5Mbps uplink and a 9Mbps downlink.

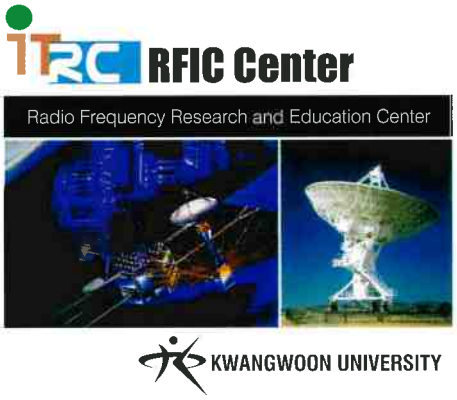
For 2004, PREGINET participated in the AI3 Spring Meeting in Malang, Indonesia on April 14 to 16, 2004, and hosted the AI3 Autumn Meeting which was held on October 5 to 8, 2004 in Cebu City.

Trans-Eurasia Information Network 2 (TEIN2)

TEIN2 is a project that is primarily funded by the European Commission and supported by a number of Asian and European partner countries. It aims to build research and education connectivity between Europe and the Asia-Pacific region, and within the Asia-Pacific region, for the benefit of the developing countries in Asia.

The DOST, through ASTI, represents the Philippines in TEIN2. With the approval of the DOST, ASTI already submitted its Letter of Intent to participate in Phases 1 and 2A of TEIN2. ASTI is also in the process of formalizing its involvement in this initiative through the signing of a Memorandum of Agreement (MOA) with the implementing organization of TEIN2, the Delivery of Advanced Network Technology to Europe Limited (DANTE).

DANTE is owned by the European National Research and Education Network (NREN). It is working closely with the European Commission and Europe's NREN in order to plan, build and operate pan-European networks for research and education networking by providing data and communications infrastructure essential to the success of many research projects in Europe.



Partnership with KWANGWOON UNIVERSITY - RADIO FREQUENCY IC RESEARCH AND EDUCATION CENTER of Korea

The Advanced Science and Technology Institute, the University of the Philippines Department of Electrical and Electronics Engineering (UP-EEE) and the Kwangwoon University Radio Frequency IC Research and Education Center of Korea, formally forged a partnership through the signing of a Memorandum of Understanding (MOU) on November 9, 2004.

The areas of cooperation include, but are not limited to, programs on Microwave and Millimeter-wave Devices and Circuit, RFIC/MMIC including Design and Measurement, and Microwave Wireless Communications. The MOU also provides for exchange of scientists and experts to initiate or implement joint research projects. Regular exchange of scientific and technical information through training-workshops is expected to be conducted to strengthen cooperation among the institutions.

Kwangwoon University Radio Frequency IC Research and Education Center of Korea is the center for research and development technology in mobile, Satellite and Wireless Communication Systems, training RF design engineers and research in Microwave and Millimeter-wave Circuits & Systems, in cooperation with industry.

International Conference Organized

2004 AI3 Autumn Meeting
CEBU PHILIPPINES
OCT 5-8, USC TALAMBAN

The School on the Internet (SOI-Asia) Meeting and the Asian Internet Interconnection Initiatives (AI3) Autumn 2004 Meeting

The Philippines, through ASTI, co-organized the School on the Internet (SOI-Asia) Meeting and the Asian Internet Interconnection Initiatives (AI3) Meeting on October 5 to 8, 2004 at the University of San Carlos, Talamban Campus, Cebu City.

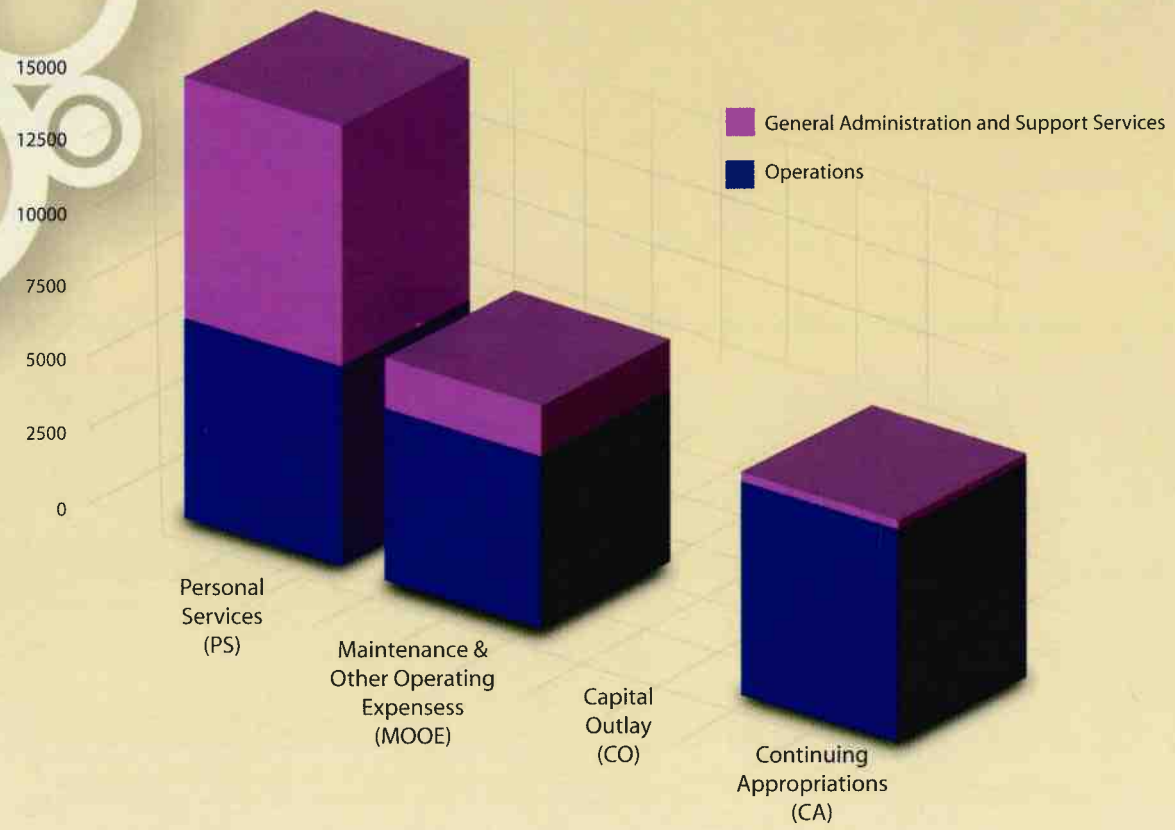
The event was well-attended, with a total of 38 foreign delegates, and 70 local participants. International delegates came from countries such as Cambodia, Japan, Indonesia, Laos, Malaysia, Mongolia, Myanmar, Nepal, Philippines, Singapore, Thailand, and Vietnam.

AI3 conducts bi-annual meetings to convene partners and present the status and activities of their different projects; discuss the initiatives of AI3 research working groups; address some issues and concerns; interact with each other; and demonstrate and share some applications they have developed and/or enhanced for deployment over the AI3 network and that of the AI3 partner institutions. The meetings also provide an opportunity for AI3 partners to share their expertise in the field of advanced networking technologies, services and applications, and in other relevant fields of endeavor.

Back-to-back with the AI3 Meeting, the School-on-the-Internet Asia (SOI-Asia) partner institutions were also convened to discuss updates, concerns, issues and plans of SOI-Asia. Lectures, demonstrations and/or tutorials on different applications on distance education and human resource enhancement, as well as curriculum planning, were carried out. Through ASTI, the Philippines is a member of the AI3 and also participates in the SOI-Asia activities.

The event was organized by the AI3 Consortium with local support from ASTI, the Department of Science and Technology (DOST), DOST-Regional Office No. VII (DOST-VII), the Central Visayas Information Sharing Network (CVISNET) Foundation, Inc., the University of San Carlos – Talamban Campus, and Innove Communications.

Distribution of Obligations Incurred in 2004
(in Thousand Pesos)

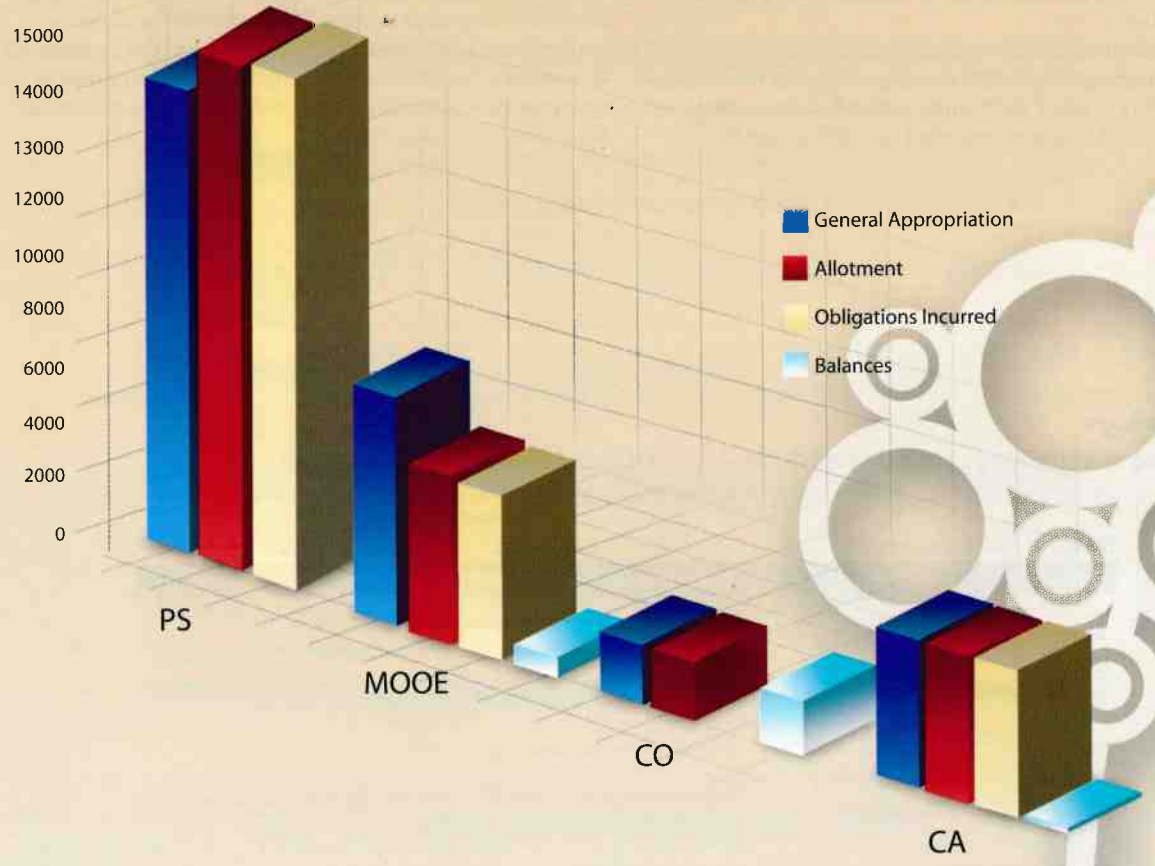


Distribution of Obligations Incurred in 2004
(In Thousand Pesos)

	Operations	General and Administrative and Support Services	Total
Personal Services (PS)	6,898	7,943	14,962
Maintenance & Other Operating Expenses (MOOE)	3,427	1,481	4,908
Capital Outlay (CO)	0	0	0
Continuing Appropriations (CA)	4,219	172	4,391
TOTAL	**14,635**	**9,626**	**24,261**

Resources Management

2004 Utilization Levels
(in Thousand Pesos)



2004 Utilization Levels (in Thousand Pesos)	General Appropriations	Allotment	Obligations Incurred	Balances
Personal Services (PS)	14,141	14,962	14,962	0
Maintenance & Other Operating Expenses (MOOE)	7,210	5,319	4,908	411
Capital Outlay (CO)	1,000	1,000	0	1,000
Continuing Appropriations (CA)	4,501	4,501	4,391	110
TOTAL	**26,852**	**25,782**	**24,261**	**1,521**

Staff Profile

The Institute has been allocated 49 plantilla positions under the Department of Science and Technology. As of December 31, 2004, ASTI has a total of 44 employees holding 90% of the agency's plantilla positions. The incumbents occupy 37 out of the 41 regular positions and seven (7) out of the eight (8) contractual positions. These 44 personnel are comprised of 16 administrative and 28 technical staff.

In furtherance of the Institute's pursuit of national excellence through R&D, ASTI has also engaged the services of a total of 45 project staff under the different projects funded by DOST and implemented by ASTI. A significant number of these personnel are hired under the COMPETE program of DOST, particularly the Virtual Center for Technology Innovation (VCTI) in Microelectronics and VCTI in Information and Communications Technology.

ASTI values the growth of its workforce and encourages and advocates the continuous learning of its staff. The Institute supports the pursuit of graduate degrees in both technical and non-technical fields. The staff are also encouraged to participate in various conferences, trainings and seminars that provide them the opportunity to enhance their knowledge and skills in their areas of specialization, as well as other relevant fields, to further their career development.

Staff Trainings

Some of the staff trainings attended for 2004 are highlighted in the following tables:

Technical Trainings (Local)

Date	Title of Training/Workshop/Demo
January 27 to 30, 2004	Defining Your Software Process Improvement: An Introduction to CMMI with Focus on Level 3 Process Areas
March 22 to 24, 2004	Structured Software Testing Techniques Training
April 17 & 24, 2004; May 1,8,15, 2004	Short Course on Java Programming
April 26, 2004 to May 21, 2004	Digital Analog Integrated Circuit (IC) Design Curriculum Transfer and Development program
May 24 to 28, 2004	Java sa Gobyerno
May 25 to 26, 2004	APNIC Training
October 4 to 14, 2004	Developers Training
October 22, 2004	VClass Software Training
November 16 to 20, 2004	Advanced Java
November 25 to 27, 2004	ECE Conference

Non - Technical Trainings

Date	Title of Training/Workshop/Demo
February 16, 2004	5S of Good Housekeeping
February 23, 2004	Effective Leadership Skills
March 11, 2004	W30 Women's Day Event
March 17, 2004	Recreating Leadership Seminar
March 22 to 23 , 2004	Training on IP Valuation and Commercialization
March 25 to 27, 2004	Project Management Training
March 26, 2004	Complaints Management: Using Customer Feedback as a Strategic Tool
July 12 to 14, 2004	Automated Records Management Systems: Best Practices
July 14, 2004	Intel Faculty Forum
August 9 to 10, 2004	VLSI Curriculum Workshop
August 9 to 13, 2004	2004 DOH Information and Communications Technology Updates
August 11 to 14, 2004	Directions for Change Beyond May 2004
October 25, 2004	Making Your IP Your Most Valuable Business Seminar
November 23, 2004	Seminar on Conducting Effective Oral Presentations
November 25-26, 2004	Project Management Training

Agency Divisions

Office of the Director (OD)

The Office of the Director (OD) oversees the overall welfare of the Institute. It sets its strategic direction, formulates internal polices and ensures the implementation of the policies to attain its goals and objectives. It also plans and monitors research programs, projects and other activities of the Institute; sets agency performance indicators and evaluates agency performance based on the formulated indicators; oversees the development of the competencies and expansion of the capabilities of the Institute; formulates the Institute's overall communication and promotion strategies; establishes and sustains partnerships and linkages with external organizations; and looks for funding sources for the Institute's different programs and activities.

(SEATED) Narcisa Juvilyn C. Castaneda, Fernando G. Calso, Denis F. Villorente (OIC and Deputy Director), Pedrito B. Mangahas, Maricel N. Zulaybar
(STANDING 2ND ROW) Ma. Lourdes C. Trinidad, Emma P. Juco, Maria Theresita E. Patula, Almira C. Cristobal
(NOT IN PICTURE) Geraldine I. Lugod

(SEATED) Aurora T. Leonido, Milites D. Pedro, Atty. Carmencita M. Echano (Chief Administrative Officer), Antoniette C. Quintos, Marylou N.Rubillos.
(STANDING 2nd ROW) Karen L. Felix, Fernando G. Calso, Danilo R. Hapin, Adrian P. Mangaoang, Wilson V. Bautista, Janice P. Udtohan.
(NOT IN PICTURE) Gay Concepcion S. Bugagao

Finance and Administrative Division (FAD)

The Finance and Administrative Division (FAD) provides general support and administrative services such as the management of the Institute's assets, supply, financial, human resources and records. It also manages the Institute's library of technical books, manuals, leading technical journals and other publications. The management of ASTI facilities is also handled by FAD.

Communications Engineering Division (CED)

The Communications Engineering Division (CED) aims to contribute to the emergence and growth of the local and communications engineering industry through research and development in communications engineering and its applications for the industry, government, academe and other sectors of the society. Its efforts include development, enhancement and deployment of systems on broadband wireless networks and platforms; RF/microwave circuit design; audio,video and voice over IP applications; and the management of the Philippine Research, Education and Government Information Network (PREGINET), the Research and Education Network of the Philippines that interconnects government, academe and research institutions nationwide for R&E activities and spearheads the development of applications in areas such as distance education, telehealth, agriculture, bioinformatics, disaster mitigation, and networking technologies.

(SEATED) Anna Liza P. Oleriana, Ma. Rhea D. Santos, Jennifer A. Picones, Ma. Theresita E. Patula, Frances Gratchen P. Samonte,Romeliza S. Lopez
(STANDING 2ND ROW) Rey Vincent P. Babilonia, Mark Jayson R., Alvarez, Edwin D. Vinas, Cesar S. Dideles, Jr., Dominador P. Carlos, Mark Raymond B. Par, Jerremeo Raynier T. Gabas, Jelina Tanya H. Tetangco, Geraldine C. Ona
(STANDING 3RD ROW) Ojie L. Santillan, Bayani Benjamin R., Lara, Jovette D. Donovan, Zeppy B. Vilan, Mark Lester P. Terrado
(NOT IN PICTURE) Joselito A. Layno (OIC-CED), Mark Christiane, D. Mijares, Francisco T. Ismael, Jr., Paul Raymond A. Afroilan, Jose Orlando I. Lozada

(SEATED) Jaime Sebastian G. Sicam, Katrina T. Murga, Peter Antonio B. Banzon(CSD Chief), Joseph F. Syjuco
(STANDING 2ND ROW) Francis Noel S. Reyes, Billy S. Pucyutan, Jovito E. Enaje, Ricardo S. Galinato, Jr., Paul John M. Serrano
(STANDING 3RD ROW) Emmanuel P. Balintec, Michael Gerard M. Operana, Rommel C. Bersan, Rusnell A. Espinoza, Ferdinand G. Go
(NOT IN PICTURE) Pinky R. Manio, Emily R. Pagador, Joanna S. Gonzales, Ryan Joshua B. Asuncion, Arjyl V. Betan, Janice M. Ballesteros,Harris Rainier V. Osiana, Jocel A. Atienza

Computer Software Division (CSD)

The Computer Software Division (CSD) aims to be one of the leading research groups in the Philippines on software and network applications development. The group is involved in the development of Open Source Systems such as the Bayanihan Bluetooth Developer's Toolkit; Bayanihan Linux Desktop Solution; and the Bayanihan Linux Terminal Server (BLTS). It also aims to make significant contributions to national development by providing solutions for government agencies, academic institutions and SMEs and provide development platforms for the local industry.

ASTI's Management Information Systems (MIS) is also managed by the CSD. The MIS Group handles the operation, maintenance and optimization of ASTI's IT infrastructure. It is also in charge of the procurement, allocation, monitoring, and maintenance of ASTI's computing resources as well as the evaluation, design, development, implementation, and management of ASTI's information systems.

Microelectronics Division (MED)

The Microelectronics Division (MED) aims to catalyze advancements in microelectronics research by developing state-of-the art design capabilities to promote a culture of technology awareness and encourage active involvement from the academe , government RDIs, industry and other sectors. Its efforts are focused on managing the ASTI-VCTI Open Laboratory, and establishing the design foundation and know-how vital for the Philippines to enter the global market for integrated circuits.

MED has been realizing its goals through the conduct of various trainings and seminars to further enhance the skills of the country's pool of IC designers. Aside from these trainings and seminars, MED continually collaborates with government agencies, the industry and the academe to upgrade the capability of Filipino engineers and to address the needs of the local electronics industry.

(SEATED) Carmelo D. Cayaban, Jeffrey M. Mendiola, Aileen Joy A. Deoma (OIC-MED), Aaron Jay S. Cabuling, Archimedes C. Lim, Jose Redentor A. Glifonea
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(STANDING 3RD ROW) Jonathan B. Bolo, Dominador O. Braganza III,Gerwin P. Guba
(NOT IN PICTURE) Engr. Jesus C. Manio (OIC-SPD)

Special Projects Division (SPD)

The Special Projects Division (SPD) is composed of the Embedded Systems Group (ESG) and the Printed Circuit Board (PCB) Team. The ESG aims to address the growing need in embedded software and hardware design in the Philippines. The PCB Team, on the other hand, provides PCB layout design and fabrication services to ASTI's technical divisions. It also conducts its own particular platform of research to enhance its capabilities in the services it offers. SPD also offers these services to local electronics companies, academe, and other enthusiasts.

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IMAGES in this years Annual Report were contributed by the men and women of the Advanced Science and Technology Institute.


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...moving beyond possibilities